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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional): 136393-1

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on 1/24/06

Signature Jeanne E Dunn

Typed or printed name Jeanne E. Dunn

Application Number: 10/686,136
Filed: 10/15/2003
First Named Inventor: Azar Alizadeh
Art Unit: 2811
Examiner: Vu, Hung K.

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☒ attorney or agent of record.
Registration number 50,413

☐ attorney or agent acting under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 ______

Signature

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Telephone number

January 24, 2006
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☒ *Total of 1 forms are submitted.

This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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--IN THE UNITED STATES PATENT AND TRADEMARK OFFICE--

In re Application: Azar Alizadeh et al.
Serial No.: 10/686,136
Filed: October 15, 2003
Confirmation No.: 7594
Art Unit: 2811
Examiner: Hung K. Vu
Title: MONOLITHIC LIGHT EMITTING DEVICES BASED ON WIDE BANDGAP SEMICONDUCTOR NANOSTRUCTURES AND METHODS FOR MAKING SAME

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Dear Sir:

In response to the Final Office Action ("Office Action") having a mailing date of December 28, 2005, Applicants respectfully request the formal review of the legal and factual basis of the rejections in this case prior to the filing of an Appeal Brief. A Notice of Appeal is filed concurrently herewith.

CERTIFICATION UNDER 37 C.F.R. § 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on January 24, 2006.

Signature

Jeanne E. Dunn
(Printed name of person certifying)

REMARKS/ARGUMENTS

Claims 6-13 and 15-24 are pending in the Application.

Claims 6-13 and 15-24 stand rejected.

I. REJECTIONS UNDER 35 U.S.C. §102(e):

The Examiner has rejected Claims 6, 8-10, 12-13, 15-17, 19 and 20 under 35 U.S.C. § 102(e) as being anticipated by Hasegawa et al., United States Patent No. 6,709,881 ("*Hasegawa*"). The Examiner contends that "Hasegawa et al. discloses, as shown in Figures 5C-9, a device comprising: a substrate (11); nanostructures of wide bandgap material (14,15,16), wherein the nanostructures of wide bandgap material comprise an n-type portion (14) and a p-type portion (16) and wherein the nanostructures of wide bandgap material are selected from the group consisting of low-defect nanostructures of wide bandgap material, quantum confined nanostructures of wide bandgap material, surface confined nanostructures of wide bandgap material, and combinations thereof, and wherein the nanostructures of wide bandgap material are selected from the group consisting of quantum dots, quantum wires (or layers) (which is MQW), and combinations thereof." Office Action at 2 (*emphasis added*).

Claim 6, from which all other pending claims directly or indirectly depend, requires that the nanostructures be in the form of quantum dots and/or quantum wires. Applicants respectfully submit that *Hasegawa* neither teaches nor suggests the use of either quantum dots or quantum wires, and that the Examiner is incorrect in equating quantum wires with quantum wells.

The terms "quantum wire" and "quantum dot" are commonly-used in the art and are used in the Application in a manner consistent with their use in the art. See Application, para. [0035] and [0036]. Quantum wires and quantum dots are accepted by those knowledgeable in the art as being nanostructures that are quantum confined (and correspondingly nanoscale) in two and three dimensions, respectively, whereas quantum wells are quantum confined in only a single dimension. As evidence of this, and to further illustrate the differences between quantum dots and wires from quantum wells, in an office action response filed under 35 U.S.C. §1.111 on October 14, 2005 ("Office Action Response"), Applicants attached, as Exhibit A, the following reference: D. Bimberg, M. Grundmann, and N. Ledentsov, *Quantum Dot Heterostructures*, John Wiley & Sons, New York, 1999, pages 1-6, said reference pointing out the dimensional differences between quantum wells, quantum wires, and quantum dots. Fig. 1.2 on page 4 of Exhibit A, clearly illustrates the differences in dimensionality on going from quantum wells to quantum dots.

As pointed out in the Office Action Response, *Hasegawa* does not teach nanostructures of wide bandgap material that are quantum confined (i.e., nanoscale) in *at least* two dimensions, as are the quantum dot and quantum wire nanostructures of the present invention—as put forth in Claim 6. Parts 14-16 (*Hasegawa*, Figs. 1-6, and 8) of *Hasegawa* to which Examiner points out are layers of semiconductor having nanometer thickness. While in some embodiments of *Hasegawa* these semiconductor layers are "quantum wells" (when they are sufficiently thin), they are at most quantum confined in a single dimension. Consequently, *Hasegawa* cannot be said to teach quantum dots and/or quantum wires, and the Examiner's rejection of Claim 6 under 35 U.S.C. § 102(e) as being anticipated by *Hasegawa* is improper. Moreover, there is no suggestion by *Hasegawa* to use quantum wires or quantum dots in the construction of their devices.

In rejecting Claim 8, Examiner contends that "Hasegawa et al. discloses the device further comprising a nucleation layer (12) interposed between the substrate and the nanostructures of wide bandgap material." Office Action at 2.

Referring to Figure 1 of the Application, Applicants respectfully point out that a nucleation layer 102, as defined in the Application, is used to grow monolithic nanostructures 105 in a patterned nanostructured template 104, the nanostructured template comprised of a dielectric layer 103 residing on the nucleation layer, and the dielectric layer having been patterned with a nano-lithographic technique. The purpose of such a nucleation layer 102 is to nucleate growth of nanostructures in the nanostructured template 104 using growth techniques such as chemical vapor deposition, molecular beam epitaxy, etc. See Application, p. 10, para. 42. The layer (12) to which the Examiner points in *Hasegawa* is neither referred to, nor used as, a nucleation layer within the context of the definition put forth in the present Application. Accordingly, Claim 8 is not anticipated by *Hasegawa* for the same reasons as Claim 6 (from which it depends) and also because *Hasegawa* fails to teach a nucleation layer.

Regarding Claims 9, 10, 12, 13, 15-17 and 19-20, such claims depend directly from either Claim 6 or Claim 8 (which depends from Claim 6). Accordingly, Claims 9, 10, 12, 13, 15-17 and 19-20 are not anticipated by *Hasegawa* for the same reasons that Claim 6 and Claim 8 are not anticipated by *Hasegawa* (see above).

II. REJECTIONS UNDER 35 U.S.C. §103(a):

The Examiner has rejected Claims 7, 11, 18 and 21-24 under 35 U.S.C. §103(a) as being obvious in view of *Hasegawa*. Office Action at 4.

As all of the above-rejected claims depend directly or indirectly from Claim 6, the Examiner's rejection of Claims 7, 11, 18 and 21-24 is predicated on Claim 6 being anticipated by *Hasegawa* which, as shown above, it is not. Accordingly, the Examiner's rejection of Claims 7, 11, 18 and 21-24 under 35 U.S.C. §103(a) as being obvious in view of *Hasegawa* is improper.

In rejecting Claims 7 and 11, Examiner contends that "Hasagawa et al. discloses the claimed invention including the device as explained in the rejection above," and that while *Hasegawa* fails to disclose that the substrate comprises a conductive material or bulk GaN with the density as claimed, "it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the substrate of Hasegawa et al. comprising a conductive material or bulk GN [sic], as that claimed by Applicant." Office Action at 4.

Applicants respectfully submit that Claim 11 requires that the GaN substrate possess a dislocation density of less than about 10^4 cm^{-1}. As such low defect GaN is quite elusive (see Application, p. 1, para. 2), it is difficult to imagine how it would be obvious to use such a material in the devices of *Hasegawa*. It is also worth pointing out that *Hasegawa* subjects substrate (11), to which the Examiner points, to a thermal cleaning process at 1100°C. *Hasegawa*, col. 5, *ll.* 32-37. GaN melts at 600°C.

In rejecting Claim 18, the Examiner contends that "Hasegawa et al. discloses the claimed invention including the device as explained in the rejection above," and that while "Hasegawa et al. does not disclose the density of the wide bandgap nanostructures...it would have been obvious to one having ordinary skill in the art at the time the invention was made to form wide bandgap nanostructures having a desired density." Office Action at 5.

Again, *Hasegawa* does not teach nanostructures that are quantum dots or quantum wells, only layers of nanometer thickness (see above). Such discussion of nanostructure density, i.e., number of nanostructures per square centimeter, is therefore nonsensical within the context of *Hasegawa*.

III. CONCLUSION:

Applicants again submit that the rejections of Claims 6, 8-10, 12, 13, 15-17, 19 and 20 under 35 U.S.C. §102(e) as being anticipated by *Hasegawa*, and the rejections of Claims 7, 11, 18 and 21-24 under 35 U.S.C.§ 103(a) as being obvious in view of *Hasegawa*, are improper. Applicants respectfully request that this case be reopened and that the rejections be withdrawn and a timely Notice of Allowance be issued.

Respectfully submitted,

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